

1.9321
N2L69
Cap.2

NORTHERN

Utilization Research & Development Division

Publications and Patents

July - December 1965

PROCUREMENT SECTION
CURRENT SERIAL RECORDS

FEB 1 74

U.S. DEPT. OF AGRICULTURE
NATIONAL LIBRARY

**Agricultural Research Service
United States Department of Agriculture**

CONTENTS

	Page
Introduction- - - - -	3
Request for Information - - - - -	3
Subject Index for Publications - - - - -	4
Publications - - - - -	5
Patents - - - - -	37
Licensing of Patents - - - - -	39

Northern Utilization Research and Development Division
Agricultural Research Service
United States Department of Agriculture
1815 North University
Peoria, Illinois 61604

Issued January 1966

INTRODUCTION

The Congress in 1938 authorized four regional laboratories, now known as Utilization Research and Development Divisions, to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. The need and importance of such research arise because the farmer is not organized to carry on modern scientific research to maintain old markets for his products and to create new ones. Since their inauguration, these laboratories have contributed much basic knowledge of the chemical composition and physical properties of farm commodities and have applied this knowledge to create new or improved products and processing technology that have enhanced utilization of many farm commodities.

The Northern Division is responsible for research on industrial utilization of the cereal grains—corn, wheat, barley, grain sorghum, and oats; and

the oilseeds—soybeans and flaxseed. Except for wheat and barley, the research includes food and feed uses of these crops. In the Department's program of research on replacement crops, the Northern Division conducts all screening and characterization studies on uncultivated plants and their components. It is also responsible for more intensive research on new oilseeds containing erucic acid and on new gum and pulp fiber plants. In addition to its internal program of research, it carries out work through domestic contracts and grants and conducts related research abroad under grants or contracts involving Public Law 480 funds.

The research investigations at the Northern Division are supported by more than 400 people, about one-half of whom have professional status. This body of highly trained men and women with specialized knowledge in various disciplines are responsible for the scientific publications and patents listed here.

REQUEST FOR INFORMATION

The results of the research of the Northern Division are published regularly in the technical literature, and public-service patents are secured to cover patentable inventions and discoveries (see page 37). As a convenient guide to our publications and patents, a list with abstracts is published semi-annually. The abstracts describe the current research and indicate the progress achieved. Further information on any of the developments, as well as earlier technical papers, may be obtained by writing us.

In conformance with the policy of the Department of Agriculture, Northern Division publications are available to scientists and other specialists, librarians, representatives of the press, and others interested.

Requests for specific reprints should be by

number and addressed to the Northern Division. Those titles marked with an asterisk [*] are not available for distribution.

Most of the publications are in journals that are available in libraries. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U.S. Department of Agriculture, Washington, D.C. 20250.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with the Director of the National Agricultural Library.

Copies of previous lists of publications and patents are available upon request.

July-December 1965

.....

SUBJECT INDEX for PUBLICATIONS

[Compiled by reprint order number. Numbers marked (*) do not have reprints available for distribution.]

CEREAL GRAINS:

General: 1855*, 1857*, 1860, 1879, 1892,
1896, 1902, 1910, 1928, 3-G,
85-F, 93-F

Starch: 1865, 1872, 1873, 1875, 1880,
1901, 1914, 1915, 1916, 1927,
147-C, 96-F

Wheat: 1855*, 1857*, 1858, 1900, 1904,
1905, 148-C, 91-F

Corn, Sorghum, and Other Grains: 1855*,
1857*, 1877, 1881, 1887, 1895,
84-F, 94-F

High-Amylose Corn: 1918

Fermentative Conversion and Microbiology:
1856, 1861, 1862, 1863, 1864,
1871, 1874, 1882, 1884, 1885,
1886, 1894, 1897, 1911, 1923*,
1924, 152-C, 154-C*, 81-F,
83-F, 92-F

OILSEEDS:

General: 1867, 1878, 1889, 1890, 1891,
1899, 1903, 1929, 144-C, 146-C,
151-C, 155-C, 158-C, 89-F

Linseed Oil: 1844, 1859, 1907, 1930,
1931, 1932, 153-C*, 156-C, 95-F

Soybean Oil: 1868, 1869, 1870, 1876,

1891, 1906, 1925, 1933, 89-F,
90-F

Soybean Meal and Protein: 1888, 1893*,
1935, 86-F, 88-F, 89-F

Fermentative Conversion and Microbiology:
82-F, 87-F

NEW CROPS:

General: 1898

Oilseeds: 1883, 1891, 1908, 1909, 1912,
1917, 1921, 1922, 1926, 1934,
145-C, 149-C

Vegetable Gums: 1913

Pulping Crops: 1866, 1920

July – December 1965

• • • • •

PUBLICATIONS

[Publications marked (*) are not available for distribution. When requesting reprints, please order by number.]

1844 • Pigment Interactions in Aqueous Media

L. H. PRINCEN

Offic. Dig. Federation Soc. Paint Technol. 37(485): 766-781. July 1965

Studies on the interaction between zinc oxide and titanium dioxide in aqueous systems have been expanded to include other pigments and extenders present in water-base paints. The interaction mechanism proposed satisfactorily explains or predicts increases in viscosity, sedimentation volume, and pH in suspensions containing mixtures of colloidal particles used in paint technology. The isoelectric point, the surface charge, and charge capacity of

various pigments have been established. These parameters are the major factors determining the behavior of suspended particles of one material toward suspended particles of another. The effect of various additives upon interacting systems is discussed, and some suggestions are made for possible ways to improve viscosity stability in aqueous paint formulations.

1855* • Opportunities for Developing Outlets for Grain

W. DAYTON MACLAY

In "Expanding Outlets for Agricultural Products," a report of the National Marketing Service Workshop, Memphis, Tenn., November 5-7, 1957, U.S. Dept. Agr., AMS-253, pp. 130-136. July 1958

Increasing the use of cereal grains, particularly wheat, involves three main approaches; namely, creating or improving food, feed, and industrial

products. The USDA utilization research program on cereal grains is discussed in relation to these approaches.

- 1856 • Amino Acids in the Haemolymph of Diseased Popillia japonica (Newman) Larvae
ODETTE L. SHOTWELL, GLENN A. BENNETT, HARLOW H. HALL,
ROBERT D. STUBBLEFIELD, JOHN E. PETERS, CECIL H. VanETTEN, and
RICHARD W. JACKSON
J. Insect Physiol. 11(6): 671-682. June 1965

Free amino acid constituents in the hemolymph from diseased Popillia japonica (Newman) larvae were determined by ion-exchange chromatography, paper chromatography, enzymatic analysis, and amperometric titration. Hemolymph from larvae infected with Bacillus popilliae, compared with that from healthy larvae, contained higher concentration of glutamic acid, β -alanine, aspartic acid, phenylalanine, threonine, serine, and lysine and lower concentrations of glycine, tyrosine, and histidine. Differences in the amino acid composition depend on the infective organism. The only amino acid to increase during infection with B. lentimorbus was glutamic acid. Amounts of histidine, proline, glycine,

alanine, valine, isoleucine, tyrosine, and arginine decreased.

The level of protein material in the hemolymph, as well as the composition, did not change markedly during infection with either B. popilliae or B. lentimorbus. Hemolymph contains little peptide of low molecular weight.

Several additional amino acids were determined in hemolymph from healthy and diseased larvae. Milky disease apparently has no effect on the concentration of tryptophan, cystine, cysteine, glutamine, asparagine, and lanthionine.

- 1857* • New Research Developments in the Marketing of Grain
KENNETH R. MAJORS¹ and WARREN K. TROTTER²
(¹USDA Fed. Ext. Serv., ²USDA Econ. Res. Serv., Peoria, Ill.)
In "New Methods and Tools for Improving Agricultural Marketing," a report of the National Marketing Service Workshop, Biloxi, Miss., November 15-17, 1960, U.S. Dept. Agr., AMS-448, pp. 142-147. July 1961

A brief review of the more significant new technical developments in grain marketing and utilization

of interest to the producer, handler, and processor of cereal grains, especially wheat.

- 1858 • Enzymatic Modification of Wheat Flour for Paper Sizing
ROSE M. WARD and J. E. GASTINEAU
Cereal Chem. 42(4): 421-428. July 1965

Soft white winter and soft red winter wheat flours were selected for modification studies. The flours were treated with amylolytic and proteolytic enzymes commercially available and also with the enzymes present in the flours for the preparation of suitable paper-sizing adhesives. Twenty percent wheat flour slurries were enzymatically modified under varying pH, time, and temperature conditions. The slurries were then heated at 95° C. for 30 to

45 minutes to gel the starch and inactivate the enzyme.

The resulting products, with viscosities from 1,000 to 5,000 cp., were applied to 7-x 8-inch sheets of unsized paper to determine their suitability as paper sizes. Conditions were established that gave adhesives which compared favorably with sizing materials now used industrially.

1859 • Potential Synthetic Lubricants: Esters of C₁₈-Saturated Cyclic Acids

J. P. FRIEDRICH, E. W. BELL, and L. E. GAST

J. Am. Oil Chemists' Soc. 42(7): 643-645. July 1965

A series of 16 esters of C₁₈-saturated cyclic acids (HCal) were prepared, and partial evaluation showed that several have qualities which recommend them as potential low-temperature lubricants. Starting materials used were primary, straight, and branched chain alcohols C₄-C₇; perfluoro alcohols; phenol; cyclohexanol; and C₁₈-saturated cyclic alcohols prepared from cyclic acids. Viscosities were measured at -40°, 100°, and 210° F. Their viscosity indexes ranged from 26 to 143. Pour points or melt-

ing points of the esters ranged from -27° to -96° F. According to a modification of the test method for military specification MIL-L-7808, the oxidative stability of these esters measured at 347°-F. was in nearly all cases equal or superior to the control bis-2-ethyl-hexyl sebacate. More severe oxidation tests showed the esters of HCal to be lower than the control in the development of acidic decomposition products.

1860 • Reactions of 1,2-O-Isopropylidene- α -D-glucofuranose 5,6-Thionocarbonate and Some Related Compounds

B. S. SHASHA, W. M. DOANE, C. R. RUSSELL, and C. E. RIST

J. Org. Chem. 30(7): 2324-2327. July 1965

Methylation of 1,2-O-isopropylidene- α -D-glucofuranose 5,6-thionocarbonate (I) gave only traces of the expected 3-O-methyl derivative and mainly 1,2-O-isopropylidene- α -D-glucofuranose 3,5,6-(S-methyl monothioorthocarbonate) (II). Benzylation of I gave the analogous S-benzyl monothioorthocarbonate derivative (III). These etherification reactions are proposed as proceeding via an ortho ester type structure (IA) which is in equilibrium with I. Methyl-

ation of 1,2-O-isopropylidene-5,6-dithio- β -L-ido-furanose 5,6-trithiocarbonate (X) gave a mixture (XI) of the corresponding 3-O-methyl derivative and the S-methyl ortho ester derivative, the ratio of which depends on the temperature of the methylation reaction. Methylation of 1,2-O-isopropylidene- α -D-glucofuranose 5,6-carbonate (VII) gave only the expected 3-O-methyl derivative (VIII).

1861 • Polymer-Producing Species of Arthrobacter

HELEN J. GASDORF, R. G. BENEDICT, M. C. CADMUS, R. F. ANDERSON, and R. W. JACKSON

J. Bacteriol. 90(1): 147-150. July 1965

Two slime-producing microorganisms, designated as NRRL B-1973 and NRRL B-1797, were isolated from a Guatemalan soil sample. Their morphological and physiological characteristics permit their assignment to the genus Arthrobacter. Both cultures produce a large amount of extracellular polysaccharide, the maximal amount being 1.4 g. per 3 g. of glucose. The carbohydrate con-

stituents of B-1973 polysaccharide are galactose, glucose, and mannuronic acid; those of B-1797 are galactose, glucose, and glucuronic acid. The organisms are morphologically and physiologically alike. The differences between these two cultures and previously described species of Arthrobacter appear sufficient to designate a new species. The name Arthrobacter viscosus sp. n. is proposed.

1862 • Elution of Acid Phosphatase from the Cell Surface of Saccharomyces mellis by Potassium Chloride

RALPH WEIMBERG and WILLIAM L. ORTON

J. Bacteriol. 90(1): 82-94. July 1965

Acid phosphatase of Saccharomyces mellis may be eluted from intact resting cells by 0.5 M KCl or other salts. However, the enzyme is not eluted at higher salt concentrations of about 2 M unless a thiol, such as β -mercaptoethanol, is included in the reaction mixture. These treatments do not significantly affect viability of the cells. Neutral compounds like sorbitol or sucrose cannot substitute for ionic compounds in eluting the enzyme from resting cells. Furthermore, the neutral compounds are also inadequate for stabilizing the protoplast structure. Possibly the enzyme is held on the cell surface by a combination of electrostatic forces and disulfide bonds. Thiol alone dissociates protein and carbohydrate from the cell surface, but the eluate has no acid phosphatase activity. Salts also remove protein and carbohydrate from the cell surface, but the amount of protein removed is considerably less than that dissociated by thiol. A concentration of 0.5 M KCl elutes more protein than does a 2 M concentration, and enzymatic activity is present only in the 0.5 M KCl eluate. The carbohydrate

eluted by either reagent has been identified as a mannan. Conditions for eluting acid phosphatase from acetone-dried cells of S. mellis are essentially the same as those for resting cells. Significantly, thiol is required at all salt concentrations to dissociate the enzyme. Pretreatment of the cells with thiol, followed by KCl, elutes acid phosphatase, whereas the reverse procedure does not. Acid phosphatase is excreted by growing cells of S. mellis into growth media if the medium contains 0.25 M KCl. The total yield of enzymatic activity may be 8 to 10 times greater than is usually present on derepressed cells grown in a salt-free medium. The enzyme can be precipitated from the culture fluid with acetone. The acetone-precipitated fraction contains mannan and protein in a ratio of 12:1 by weight. Partial purification of the enzyme by calcium phosphate gel and elution resulted in an enzyme fraction in which the specific activity on the basis of protein increased twelvefold, and the carbohydrate-protein ratio was reduced to 1:1.

1863 • A Microelectrode to Measure Dissolved Oxygen in Insect Larvae

BERNARD A. WEINER

J. Insect Physiol. 11(7): 817-830. July 1965

Variations in values for dissolved oxygen in the hemolymph of insects occur because of air exposure during collection. This fluctuation is caused by oxidation of phenolic substances and by general uptake of oxygen. To determine dissolved oxygen polaro-

graphically in the larval hemocoel of Popillia japonica Newman, an indicator cathode was devised and housed in a 27-gauge hypodermic needle. Knowledge of this value was needed in the development of infective spores to control the Japanese beetle.

1864 • 8,9,13-Triacetoxydocosanoic Acid, an Extracellular Lipid Produced by a Yeast
FRANK H. STODOLA, RONALD F. VESONDER, and LYNFERD J. WICKERHAM
Biochemistry 4(7): 1390-1394. July 1965

An extracellular lipid produced by the yeast NRRL YB-2501 is the triacetate of 8,9,13-trihydroxydocosanoic acid.

The structure of the trihydroxy acid was established by its conversion to suberic acid and 5-ketotetradecanoic acid.

1865 • Physical Properties of Periodate-Oxidized Amylose: Aggregation of Oxidized Amylose in Aqueous Solutions

STIG R. ERLANDER, H. L. GRIFFIN, and F. R. SENTI
Biopolymers 3(4): 497-508. August 1965

The ability of periodate-oxidized amylose to form aggregates in aqueous solution was studied by sedimentation, light scattering, and viscosity analyses. Ultracentrifuge schlieren patterns reveal that aggregation can be appreciable at pH 3.0 and 1.0. The hydroxyl ion-catalyzed degradation of the oxidized amylose is faster at pH 3.0 than at pH 1.0. Viscosity and sedimentation analyses conducted at pH 3.0 show that a minimum in the degree of aggregation of the oxidized molecules is obtained at

15 to 25% oxidation. Solubility studies and X-ray diffraction patterns on retrograded amylose show that maximum solubility of the retrograded amylose is obtained by oxidizing to the extent of 25 to 35%. It was therefore concluded that in the general range of 20 to 30% periodate oxidation, the oxidized amylose has a minimum ability to form intermolecular hydrogen bonds. Outside this range, oxidized amylose readily forms aggregates in aqueous solutions.

1866 • Kenaf—A Potential Papermaking Raw Material

DWIGHT L. MILLER

Tappi 48(8): 455-459. August 1965

More than 850 samples of potential new fiber crops have been evaluated in the new crops screening program. Kenaf, an annual crop, may be treated to produce pulps with properties and performance equal to most softwoods and superior to most hardwoods. The competitive economics of growing kenaf

and established crops in selected U.S. regions are presented, including methods for evaluation. A bleached pulp plant operating at 100 tons per day could utilize the production of 15,000 to 20,000 acres of land.

1867 • Nitrosyl Chloride Adduct of Methyl Oleate

W. R. MILLER, E. H. PRYDE, J. C. COWAN, and H. M. TEETER
J. Am. Oil Chemists' Soc. 42(8): 713-716. August 1965

Nitrosyl chloride was added to methyl oleate on a preparative scale to give the adduct in essentially quantitative yield. The chlorine of the adduct was quite labile; was replaced by methoxyl, hydroxyl, acetoxyl, piperidino, and amino groups; and was

eliminated to give the unsaturated nitroso compound. Under any conditions only 15 to 20% of the nitroso group of the adduct isomerized to oximino. Reduction with zinc and acetic acid gave the hydroxylamino derivative.

- 1868 • **Analyses of Fatty Acid Isomers in Two Commercially Hydrogenated Soybean Oils**
E. P. JONES, C. R. SCHOLFIELD, V. L. DAVISON, and H. J. DUTTON
J. Am. Oil Chemists' Soc. 42(8): 727-730. August 1965

A conventional shortening and a hydrogenated winterized oil have been investigated to determine their composition of natural and isomeric fatty acids. Two solvent systems were applied in counter-current distributions: the acetonitrile pentane-hexane system for separation of monoenoates from dienoates and the methanolic silver nitrate pentane-hexane system for separation of geometric isomers. While cis and trans monoenoates were well resolved, the separation of cis,cis from cis,trans dienoates was complicated by the presence of positional isomers. The fractions isolated were oxidatively cleaved, and the esters of the resultant acids were quantitatively analyzed by gas-liquid chromatography.

the two fat products were similar, the percentage of trans isomers of the shortening was more than twice that of the winterized oil. The amount of oleic acid (cis-9-octadecenoic) was 19.6% for the shortening and 25.4% for the winterized oil. The shortening contained 13.3% linoleic acid (cis,cis-9,12-octadecadienoic), whereas the winterized oil contained 30% linoleic acid.

Although our primary interest was in the estimation of cis-9-octadecenoic and cis,cis-9,12-octadecadienoic acids, the completeness of cleavage data makes it possible to estimate all geometric and positional monoenoate and dienoate isomers in the two fat products.

Although the amounts of saturated components of

- 1869 • **Flavor Evaluation of Natural Soybean Oils of High and Low Linolenate Content**
C. D. EVANS, HELEN A. MOSER, D. G. McCONNELL, J. C. COWAN, J. L. CARTTER,¹ and F. I. COLLINS¹
(¹U.S. Regional Soybean Laboratory, Urbana, Ill.)
J. Am. Oil Chemists' Soc. 42(8): 736-738. August 1965

Three varieties of soybeans--Crest, Grant, and Hawkeye--were processed in the laboratory to obtain edible oils containing 10.4, 9.4, and 5.2% linolenate, respectively. Taste panel evaluations were significantly in favor of low-linolenate soybean oils. Both high- and low-linolenate oils gave the typical off-flavors of aged soybean oil. Flavor

results indicate that the linolenate content of soybean oil will probably have to be reduced below 5% to achieve a significant quality improvement in commercially processed oils. Soybean oils of excellent quality can be prepared by laboratory processing procedures.

- 1870 • **Solvent Winterization of Partially Hydrogenated Soybean Oils**
D. G. McCONNELL, C. D. EVANS, and J. C. COWAN
J. Am. Oil Chemists' Soc. 42(8): 738-741. August 1965

Among the important advantages of solvent as compared with conventional winterization of soybean oil are the speed of operation and increased yields up to 25%. Easier and faster filtration results with the solvent system despite the high yields of solids when low iodine value (I.V.) oils are winterized at low temperatures. Hydrogenated stocks with I.V. as low as 90 can be winterized easily at temperatures

of -16°C. The time of winterization can be reduced from several days to a few hours. With all the variations possible in I.V., temperature, and solvent selectivity, liquid soybean oil can be produced with specified characteristics and with a minimum linolenate content. Acetone was the best solvent tested for winterization.

1871 • Studies on the Extracellular Proteolytic Enzymes of Rhizopus oligosporus

HWA L. WANG and C. W. HESSELTINE

Can. J. Microbiol. 11(4): 727-732. August 1965

Two proteolytic enzyme systems have been observed in the culture filtrates of Rhizopus oligosporus. One has an optimum pH at 3.0; the other, at 5.5. Both enzyme systems have maximum activities at 50° to 55°C. and are fairly stable at pH 3.0 to 6.0. Maximum production of the enzymes

occurred after 72 to 96 hours of incubation when it decreased rapidly. Higher proteolytic activity was noted in culture filtrates of the organism grown in wheat flour medium than in soybean flour. Data suggest that formation of the enzyme systems appears to be inhibited by soybean extracts.

1872 • Location of Xanthate Groups in Starch Xanthate

W. M. DOANE, C. R. RUSSELL, and C. E. RIST

Die Stärke 17(6): 176-179. June 1965

The distribution of xanthate groups among the 2-, 3-, and 6-positions of starch xanthates prepared by a rapid, continuous process was determined. Starch xanthates of degree of substitution (D.S.) 0.12 and 0.33, prepared in equal reaction time, were stabilized by reaction with benzyl bromide. Complete benzylation of the starch S-benzyl xanthate, followed by removal of the xanthate groups with mercuric acetate and hydrogen peroxide, permitted the isolation of a starch benzoate which, on subsequent methylation and debenzylation, yielded O-methyl starches possessing a methyl group at every position previously occupied by a xanthate group.

Chromatographic analysis of the products after acid hydrolysis of the O-methyl starches showed that D-glucose and its mono- and di-O-methyl ethers were present in mole ratios of 34:4:0.1 and 32:13:1 for the lower and higher D.S. products. Resolution of the mono-O-methyl component of the D.S. 0.33 product showed 67% 6-, 27% 2-, and 6% 3-O-methyl-D-glucose. The lower D.S. product showed 56% 6- and 44% 2-O-methyl-D-glucose but no 3-O-methyl-D-glucose. Tritylation of the D.S. 0.33 S-benzyl xanthate confirmed the amount of primary xanthate substitution as found chromatographically.

1873 • Distribution of Methyl Groups in Partially Methylated Starches

W. M. DOANE, N. L. SMITH, C. R. RUSSELL, and C. E. RIST

Die Stärke 17(7): 225-226. July 1965

The distribution of methyl groups in starch partially methylated by liquid ammonia-methyl iodide was determined by chromatography after hydrolysis. The monomethyl glucose fraction revealed nearly equal amounts of the C-2 and C-6 isomers and none

of the C-3 isomer. Substitution at C-3 was enhanced by etherification of the hydroxyl groups at C-2 or C-6 and significant amounts of the C-3 ether were found in the di- and trimethyl fractions.

1874 • Purification of Sexual Agglutination Factor from the Yeast Hansenula wingei by Chromatography and Gradient Sedimentation

NEIL W. TAYLOR

Arch. Biochem. Biophys. 111(1): 181-186. July 1965

The agglutination factor from mating type 5 of Hansenula wingei was fractionated by various techniques. The factor was heterogeneous in chromatography on phospho-cellulose and notably broad in its sedimentation distribution diagram. Highly active fractions could be obtained either from chromatography on phospho-cellulose or from fractions

sedimenting at rates greater than 100 Svedbergs. The most active fractions had particle weights greater than 10^8 , and only a few of these particles per cell were required to agglutinate the opposite mating type. The agglutinating factor is a protein-mannan complex.

1875 • The Destruction of Amylose Helices by Periodate Oxidation

STIG R. ERLANDER, H. L. GRIFFIN, and F. R. SENTI

Die Stärke 17(5): 151-158. May 1965

Amylose was oxidized to various degrees in aqueous medium at pH 3.0 by sodium periodate. Intrinsic viscosities, sedimentation constants, and molecular weights for each level of oxidation were measured as a function of time after oxidation, and values for these properties were extrapolated to zero time to eliminate effects of slow hydroxyl-ion-catalyzed degradation of the polymer. The intrinsic viscosity at zero time decreased with an increase in the degree of periodate oxidation until a constant value was obtained at 40% or more periodate oxidation. The sedimentation constant at zero time increased with degree of oxidation but reached a constant value at approximately the same level of periodate oxidation as that observed for the vis-

cosity studies. Extrapolated molecular weights for all levels of oxidation were the same. The decrease in intrinsic viscosity and increase in sedimentation constant indicate that a decrease in the radius of the polymer or its segment length occurs with an increase in periodate oxidation. The relative decreases in radii of gyration were compared to the destruction or disappearance of unoxidized chain sequences \times anhydroglucose units long. Both were plotted against degree of oxidation. The results suggest that in neutral aqueous medium, amylose exists as a complete helix with few breaks in the helical structure and that each helix contains about eight glucose units.

1876 • Advances in Research on the Flavor Stability of Edible Soybean Oil—A Review

J. C. COWAN

Food Technol. 19(9): 107-110. September 1965

Significant advances and current studies on the flavor stability of soybean oil at the Northern Division are reviewed. Among the factors discussed are the importance of metal impurities and their inactivation, identity of the precursors of undesirable

flavors, need for protection from air and light, hydrogenation and hydrogenated winterized oil, lowering tocopherol and other minor components, and omitting the bleaching step.

- 1877 • **Zein: A Heterogeneous Protein Containing Disulfide-Linked Aggregates**
JAMES E. TURNER, JOYCE A. BOUNDY, and R. J. DIMLER
Cereal Chem. 42(5): 452-461. September 1965

Agar and starch gel electrophoresis showed that zein is heterogeneous and also that this prolamine of corn, as it exists naturally, contains disulfide-linked aggregates. Native zein exhibited several mobile components and a fraction that did not migrate into the gel upon electrophoresis. All components were mobile following reduction of disulfide

bonds. Reduction of native zein also lowered the weight-average molecular weight from 44,000 to 21,000. The mobile fraction was identical to alpha zein, a fraction soluble in 95% ethanol. The immobile fraction resembled beta zein, which is insoluble in 95% ethanol.

- 1878 • **Homogeneous Hydrogenation of Methyl Linolenate Catalyzed by Iron Pentacarbonyl. Formation of Methyl Octadecatrienoate-Iron Tricarbonyl Complexes**
E. N. FRANKEL, E. A. EMKEN, and V. L. DAVISON
J. Org. Chem. 30(8): 2739-2745. August 1965

Studies with $\text{Fe}(\text{CO})_5$ as a soluble catalyst for the hydrogenation of unsaturated fatty esters have been extended to methyl linolenate. Products were separated into monoenes, dienes, trienes, and iron carbonyl complexes of dienes and trienes by countercurrent distribution. Further separation of isomers was carried out by argentation (countercurrent distribution and chromatography). Trienes included isomers in which two and three double bonds are conjugated. Dienes were 50% conjugated with double bonds distributed between the 5- and 16 positions. Nonconjugated dienes had double bonds separated by several methylene groups. Monoenes

had a distribution of double bonds consistent with a reduction of the complexed conjugated dienes by 1,2-addition. The diene- $\text{Fe}(\text{CO})_3$ complexes have the same structure as the corresponding complexes of linoleate but have a wider distribution of positional isomers. Triene complexes were characterized as a mixture of isomers containing a stable conjugated diene- $\text{Fe}(\text{CO})_3$ unit and a noncomplexed olefinic bond either α, β to the π -complexed system (I) or separated by several methylene groups (II). These triene complexes are postulated as intermediates in the homogeneous hydrogenation.

- 1879 • **Relative Nucleophilic Reactivities of Amino Groups and Mercaptide Ions in Addition Reactions with α, β -Unsaturated Compounds**
MENDEL FRIEDMAN, J. F. CAVINS, and J. S. WALL
J. Am. Chem. Soc. 87(16): 3672-3682. August 1965

Factors were investigated which govern nucleophilic reactivities of functional groups in aminothiols, thiols, and other model compounds with α, β -unsaturated compounds, such as acrylonitrile. Rates as a function of pH correlate with theoretical rate equations and indicate that mercaptide ions and nonprotonated aminogroups participate in the rate-determining step. Possible reaction pathways of aminothiols are considered in terms of the two functional groups. A quantitative estimate of the influence of steric and polar parameters on rates of mercaptide ions was obtained from a Hammett-Taft-type free-energy relation derived from observed linear Brønsted-type plots. The polar and steric

reaction parameters of mercaptide ions are similar to those of amino groups. At comparable pK values and steric environments, sulfur anions are about 280 times more reactive than amino groups. A single, free-energy equation is developed that relates reactivities of mercaptide and amino groups to polar, steric, and nucleophilic parameters. Relative rates of these functional groups with several vinyl compounds remain essentially constant. The predictions of kinetic data, that α, β -unsaturated compounds should react preferentially with SH groups in aminothiols attached to primary carbon atoms, but not with those attached to tertiary, were confirmed by synthetic applications.

1880 • Concentration Dependence in Ultracentrifugal Molecular Weight Determinations of Heterogeneous Nonelectrolyte Polymers

STIG R. ERLANDER and JAMES P. MCGUIRE

Makromol. Chem. 86: 33-42. August 1965

Equations were developed for the concentration coefficient of a nonelectrolyte in ultracentrifugal molecular weight determinations and for the expected value of $\overline{M}_z + 1$ for both A-B- and A-R-B₂-condensation polymers. The value of $\overline{M}_z + 1/\overline{M}_z$ is 4/3 for A-B-polymers and 10/3 for A-R-B₂-polymers. The equations show that the concentration coefficient from the apparent Z-average molecular weight (B_z) divided by that from the apparent weight-average molecular weight (B_w) should be $B_z/B_w = 2(\overline{M}_w/\overline{M}_z)$. Data were obtained on a low-

molecular-weight branched polymer isolated from dent corn starch. The values of $\overline{M}_z/\overline{M}_w$ obtained from the extrapolated molecular weights for the entire sample and for the components at cell bottom (b) were $\overline{M}_z/\overline{M}_w = 2.9$ and $\overline{M}_{z,b}/\overline{M}_{w,b} = 1.6$, whereas the respective values of the ratio from B_z/B_w were $\overline{M}_z/\overline{M}_w = 3.9$ and $\overline{M}_{z,b}/\overline{M}_{w,b} = 2.0$. Hence, the theoretical equation $B_z/B_w = 2(\overline{M}_w/\overline{M}_z)$ explains why the value of B_z can be less than the value of B_w for heterogeneous polymers.

1881 • Experimental Unit Now Suitable for Scale-Up to Mill Production Size

L. A. WEINECKE and R. R. MONTGOMERY

Am. Miller 93(9): 8-9, 33. September 1965

An experimental degerminator was designed and built with a 6-inch diameter, 10-inch long, stainless-steel brush rotating at 4,400 r.p.m. within a housing of 7/64-inch round perforated sheet of 7-inch diameter and having 1/8-inch high by 1-inch wide by 10-inch long impact bars attached. The action obtained with this machine is one of attrition, to crack the

grain, and of scouring, to release the germ and color-bearing seedcoat. Degermination of typical lots of commercial mix and identity-preserved grain sorghums with this laboratory machine produced from 64 to 77% yields of + 25 mesh, hull-free grits having oil contents ranging from 0.30 to 0.50%.

1882 • Symposium on Microbial Insecticides. II. Milky Disease of the Japanese Beetle

R. A. RHODES

Bacteriol. Rev. 29(3): 373-381. September 1965

A technique has been established for permanently maintaining pure cultures of the milky disease organisms in a state from which they can be readily propagated in a virulent form. The pathogens now can be grown to reasonable numbers rapidly and under conditions suitable for commercial practice. Vegetative cells produced under these conditions are infective, and a correlation has been observed between the composition of the insect hemolymph, the physiology of the bacteria, and the conditions for

growth *in vitro*. A slight degree of sporulation has been reproducibly obtained on special agar media by selected strains; this circumstance has allowed preliminary study of the process of sporogenesis. Sporulation does not occur during growth in liquid media, and cells die rapidly at the conclusion of the growth phase. It is theorized that the cells become irreversibly committed to spore formation as they reach a point of vegetative proliferation and die because they are unable to complete the process.

- 1883 • **Prototropic Rearrangement of a 1,4-Enyne. Products and Mechanism**
K. L. MIKOLAJCZAK, M. O. BAGBY, R. B. BATES, and I. A. WOLFF
J. Org. Chem. 30(9): 2983-2988. September 1965

The alkaline rearrangement of methyl crepenyn-ate (methyl-cis-9-octadecen-12-ynoate) proceeds through a cis-enallenic intermediate to trans,cis, trans- and trans,cis,cis-8,10,12-octadecatrienoic acids in 70% yield. The formation of the isolable enallene is base catalyzed, but the second step, resulting in conjugated trienes, is thermal. These

conjugated trienoic acids have been cyclized thermally to a disubstituted cyclohexadiene in good yield. The mechanism by which the Δ^{10} double bond of the conjugated triene becomes exclusively cis is probably an intramolecular 1,5-proton transfer via a cyclic transition state.

- 1884 • **New Heterothallic Species of Hansenula. I. Hansenula fabianii**
LYNFERD J. WICKERHAM
Mycopathol. Mycol. Appl. 26(1): 79-86. June 1965

As the genus Hansenula is at present constituted, H. fabianii appears to be the first species of its phylogenetic line to have become independent of trees and bark beetles. It is also the last species of its line to occur in nature with the haploid, or basic, number of chromosomes. So near is it to the diploid level of evolution that a sporulation medium rich in malt extract favors the development of diploid vegetative cells in the period between conjugation of opposite sexes and the onset of sporulation. The diploid form is easily isolated from the mixture and,

as long as sporulation is prevented, may be kept in pure state. Media that favor vegetative development of the species favor its occurrence as haploid vegetative cells. H. fabianii is most closely related to Hansenula subpelliculosa Bedford, which occurs in nature as the diploid form. Both species have been isolated almost exclusively as contaminants of fermentations, and both have been used industrially in Oriental fermentations to make alcoholic beverages or foods.

- 1885 • **New Heterothallic Species of Hansenula. II. Hansenula bimundalis and Variety americana**
LYNFERD J. WICKERHAM
Mycopathol. Mycol. Appl. 26(1): 87-103. June 1965

Hansenula bimundalis occurs in a line of heterothallic species that have coniferous trees for their habitats. This yeast is the last of its phylogenetic line to be isolated from nature exclusively as haploid vegetative cells. The next species above it, as the genus is at present constituted, is Hansenula wingei Wickerham, which occurs in nature as both diploid and haploid vegetative cells. Some possess the sexual agglutination process, others do not. H. bimundalis is not sexually agglutinative, but the species has stronger sexual reactions than its variety. In the laboratory, opposite sexes of the species mate more quickly and more abundantly, besides producing more ascospores and more diploid vegetative cells than the variety; the species

also depends less upon tubes to effect conjugation. Although all strains of the variety conjugate with strains of the species, the hybrid zygotes do not produce ascospores. All nine strains of the species assimilate D-arabinose, but none of the five strains of the variety do. Evidently individuals of a common ancestral species became separated geographically some millions of years ago, the itinerant group developed into the species, and the indigenous ancestor developed into the variety. The perfect species and its variety have been placed in Hansenula, and the separate mating types have been placed in the imperfect genus Candida. Latin descriptions of all four taxa are given.

1886 • Opposite Sexes as Type Specimen for Heterothallic Haploid Yeasts

LYNFERD J. WICKERHAM

Taxon 14(6): 187-188. July 1965

According to the International Code of Botanical Nomenclature, the type specimen of a plant is limited to a single element of the species. This stipulation limits the type specimen of a yeast that occurs as two separate sexes in nature (a heterothallic-haploid species) to one or the other sex, but not both. Taxonomy of plants, however, is based primarily on sexual characteristics, and this concept is particularly true of fungi. For example, the

type of a heterothallic, haploid species would show no sexual characteristics (it is designated as imperfect) because it lacks the opposite sex. It is recommended the following exception be added to Article 59 of the Botanical Code: "The type specimen of a heterothallic-haploid species of yeast shall consist of two strains of opposite sex. One of them may be the type of the corresponding imperfect state."

1887 • Bibliography on Corn Processing

[J. E. HUBBARD] North. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., CA-71-27, 13 pp. October 1965. [Processed]

Three major industries process corn: wet milling, dry milling, and fermentation. Information on these three different industrial processes appears in a few technical treatises that have become standard references. Otherwise, the information appears

in numerous articles in trade, engineering, and scientific journals. Although not exhaustive, this bibliography cites almost a hundred references that describe the technology of corn processing.

1888 • Full-Fat Soy Flour ... And the World Food Deficit

R. J. DIMLER

Soybean Dig. 25(12): 32-34, 36-37. September 1965

The world is facing serious food shortages, especially in the developing countries. The most critical deficiency is in proteins. The soybean has excellent possibilities for supplying this need when properly processed because it contains an excellent balance of amino acids which complement the proteins found in the cereals forming the base of most diets in newly emerging countries. An extruder-

cooker process is described that produces a bland, nutritious soy flour at a reasonably low cost. Since the present equipment and method of operation require a certain level of technical development, efforts are being made to develop simple processes for use in those lands at lower states of technical development. This work is sponsored by the Agency for International Development and by UNICEF.

- 1889 • **Chromatographic Studies on Oxidative and Thermal Fatty Acid Dimers**
C. D. EVANS, D. G. McCONNELL, E. N. FRANKEL, and J. C. COWAN
J. Am. Oil Chemists' Soc. 42(9): 764-770. September 1965

A chromatographic study was carried out to investigate the nature of polymeric products in edible oils. Dimers from low-temperature oxidation of methyl linoleate were compared with thermal dimers from high-temperature polymerization of conjugated methyl linoleate. The distilled dimers were subjected to liquid-partition chromatographic separations on silicic acid columns as methyl esters, as free acids, and as methyl esters prepared by saponification and reesterification. Chromatographically isolated

dimer fractions were also rechromatographed before and after each treatment.

When thermal dimer esters are saponified and reesterified, chromatographic recoveries are quantitative, and the expected changes in polarity result; whereas with oxidative dimer esters, gross changes in polarity occur. Chromatographic separations of dimer esters or their acids fractionate into distinct areas of increasing polarity.

- 1890 • **Preparation and Polymerization of Vinyl Esters of Nonhydroxy Carnuba Wax Acids and Acrylic Esters of Carnuba Wax Alcohols**
C. S. MARVEL,¹ J. H. GRIFFITH,¹ J. L. COMP,¹ J. C. COWAN, and J. L. O'DONNELL
(¹University of Arizona, Tucson)
J. Polymer Sci., Part A, 3(8): 2877-2883. August 1965

The acrylic esters of carnuba wax alcohols and the vinyl esters of nonhydroxy carnuba wax acids have been synthesized. The acrylic and vinyl esters have been homopolymerized and copolymerized with

vinyl chloride. Acrylonitrile-acrylic ester copolymers also have been prepared. The copolymers were quite brittle when molding was attempted.

- 1891 • **Flavor and Oxidative Stability of Some Linolenate-Containing Oils**
HELEN A. MOSER, C. D. EVANS, G. MUSTAKAS, and J. C. COWAN
J. Am. Oil Chemists' Soc. 42(9): 811-813. September 1965

Because crambe, mustard seed, and rapeseed oils, like soybean oil, contain linolenate ester, they have been examined and compared with soybean oil for flavor stability after accelerated storage and after exposure to fluorescent light. Tests show that the Cruciferae oils do have similar flavor characteristics and that the addition of citric acid improves their stability. When exposed to light, the

citric acid-treated Cruciferae oils differed from soybean oil; they developed a rubbery flavor, whereas soybean oil develops a grassy flavor. Oxidative stability determined by the active oxygen method confirmed results of oven storage tests. This work supports the belief that if linolenic acid is present in an edible oil, it is a precursor to typical off-flavor development.

1892 Lead Tetraacetate Oxidation of Some Thiocarbonyl Sugar Derivatives

W. M. DOANE, B. S. SHASHA, C. R. RUSSELL, and C. E. RIST

J. Org. Chem. 30(9): 3071-3075. September 1965

Consumption of lead tetraacetate by the sulfur atom was traced in various sugar thiocarbonyl derivatives, and the resulting oxidized products were isolated and identified. The nature of oxidation varied with the structure of the sugar derivative used. A rapid consumption of 0.5 mole of lead tetraacetate per mole of 1,2-Q-isopropylidene- α -D-glucofuranose 5,6-thionocarbonate(I) gave crystalline bis(1,2-Q-isopropylidene- α -D-glucofuranose 3,5,6-orthocarbonyl) disulfide (II). The 3-Q-acetyl (III) and 3-Q-p-tolylsulfonyl (V) derivatives of I consumed one molar equivalent of the oxidant and

formed elemental sulfur and the corresponding 5,6-carbonate derivatives IV and VI. Bis(1,2:5,6-di-Q-isopropylidene-3-Q-thiocarbonyl- α -D-glucofuranose) disulfide and bis(1,2:3,4-di-Q-isopropylidene-6-Q-thiocarbonyl- α -D-galactopyranose) disulfide were virtually unaffected by the oxidant. One molecular equivalent of lead tetraacetate was consumed by 1,2-Q-isopropylidene-5,6-dithio- β -L-idofuranose 5,6-trithiocarbonate (IX) and its 3-Q-acetyl (XI) and 3-Q-p-tolylsulfonyl (XIII) derivatives resulting in the formation of the corresponding oxythiocarbonyl compounds X, XII, and XIV.

1893* • Proteiņe di Soia. Isolamento e Proprieta

[Soybean Proteins. Isolation and Properties]

J. J. RACKIS and A. K. SMITH

Minerva Dietol. 5(1): 17-24. January-March 1965

United States production of soybeans as a cash crop increased from 192 million bushels in 1944 to an estimated 693 million bushels in the 1961-1962 crop year. An estimated 9 million tons of soybean meal was produced in the 1959-1960 crop year, of which nearly 94% was used for livestock and poultry feeding; about 5% was exported; and the rest was used industrially. Also, about 140 million bushels of U.S. soybeans were exported in 1961.

The rapid increase in soybean production, to

about 60% of the world's supply, was stimulated by a domestic shortage of edible oils. The world shortage of food could support further substantial increases in the production of soybeans, and supply the much needed high quality, low-cost protein for developing countries of the world as well as for our own increasing animal feed requirements. The United States has had no surplus of soybean meal or protein; this situation is partly the result of nutritional research that demonstrated the advantage of high-protein feeds for poultry and swine.

1894 • Sporulation of *Bacillus popilliae* on Solid Media

R. A. RHODES, M. S. ROTH, and G. R. HRUBANT

Can. J. Microbiol. 11(5): 779-783. October 1965

Spores of the insect pathogen, *Bacillus popilliae* Dutky, have been formed in vitro from vegetative cultures. The procedure results reproducibly in 0.1 to 0.3% spore information in cells of colonies grown on a solid medium under strictly defined conditions. Sporulation requires a selected strain of the organism, NRRL B-2309S; a relatively large and specific concentration of certain yeast extracts; a specific type of agar; the complete absence of glucose (required, however, for vegetative growth in liquid

media); the presence of acetate; and a pH within the range of 7.2 to 7.5. Spore formation occurs slowly during 2- to 4-week incubation periods in surface colonies present in limited numbers on agar plates. Some of the spores formed in this manner survive heating for 15 minutes at 80°C., and vegetative cultures derived from such spores are pathogenic via injection for the Japanese beetle larvae, *Popillia japonica* Newman.

1895 • Utilization Research on Grain Sorghum

R. J. DIMLER

Proc. 4th Grain Sorghum Research and Utilization Conf., sponsored by the Grain Sorghum Producers Association at Amarillo, Texas, February 25-26, 1965, pp. 17-20

During the past 2 years, research on grain sorghum at the Northern Division has involved engineering studies designed to explore new milling methods to produce new products and to give increased yields of conventional products. Basic

studies have been initiated to define the problem of protein quality and feeding value of grain sorghum and its milled products. Studies on the chemical nature of pigments have been expanded to provide basic information for improvements in utilization.

1896 • Proton Magnetic Resonance Spectra of D-Glucopyranose Polymers

C. A. GLASS

Can. J. Chem. 43(10): 2652-2659, October 1965

The proton magnetic resonance spectra of carbohydrates in deuterium oxide solution were obtained and considered for probable conformation. The anomeric proton signal occurred at lowest field and was easily recognized. In the various glucose derivatives investigated, this signal occurred from 4.62 to 5.25 τ for equatorial protons and from 5.12 to 5.65 τ for axial protons. Within each of these ranges, the chemical shifts varied inversely with the electronegativity at the C₁ site, as calculated by the

technique of Gordy. Variable electronegativity at C₁ accounts for the overlap of ranges for equatorial and axial protons, thereby bringing nuclear magnetic resonance data into agreement with assignment of the C1 chair form of the pyranose ring to the linear polymers of D-glucopyranose. The orientation of the glucopyranose rings in cyclodextrins is shown to preclude ring current effects, and the up-field chemical shifts of these materials are shown to be consistent with the C1 form.

1897 • Comparison of Some Dried Holotype and Neotype Specimens of Streptomyces with Their Living Counterparts

THOMAS G. PRIDHAM, ALLISTER J. LYONS, JR., and HENRY L. SECKINGER

Intern. Bull. Bacteriol. Nomenclature and Taxonomy 15(4): 191-237, October 1965

A 42-year-old collection of dried specimens of streptomyces was examined. Insofar as possible, their characteristics were compared with those of living descendants of the cultures available from three other major culture collections. The dried specimens represent 24 holotypes and 10 potential neotypes.

None of the dried specimens were viable. Although color of aerial mycelium and spore-wall characteristics were retained, determination of colors of vegetative mycelium and diffusible pig-

ments could not be made with confidence. Determination of morphology of spore chains was not particularly successful because preparation of materials for examination was difficult.

Characteristics of the dried specimens showed a remarkable degree of similarity to comparable ones of their living counterparts. In only a few instances were determinations sufficiently different to place question on the authenticity of available living types. The results afford a sounder basis for taxonomic investigations of the streptomyces.

1898 • Dimpled-Bottomed Flasks for High-Speed Magnetic Stirring

THOMAS K. MIWA

Chemist-Analyst 54(4): 121-122. October 1965

Description of flasks and stirring bars that perform efficiently with magnetic stirrers at high

speed without disengagement of the stirring bar from the magnetic flux.

1899 • Radiation Effects of Carbon-14 and Tritium on Growth of Soybeans

W. CHORNEY,¹ N. J. SCULLY,¹ and H. J. DUTTON

(¹Argonne National Laboratory, Argonne, Illinois)

Radiation Botany 5(3): 257-263. July 1965

Soybean plants (Chief variety) were labeled with C¹⁴ or H³ by growing the plants from seedlings to maturity in hermetically sealed growth chambers containing either tritiated water or radiocarbon dioxide. Plants cultured for approximately 90 days were labeled at 86.2 μ c of C¹⁴ and 337.8 μ c of H³/g. of carbon and hydrogen, respectively. C¹⁴ plants developed a significantly greater number of visible main axis nodes than controls, whereas H³ plants developed fewer. C¹⁴ and H³ plants yielded significantly fewer pods and seed than controls. H³ plants developed tumorlike enlargements at the

stem-tip regions; the youngest leaves exhibited yellow or white chlorophyll-deficient areas. Roots of C¹⁴ plants developed numerous nodulelike structures. The C¹⁴ and H³ seed did not differ from the control seed in fatty acid composition and in percent oil. C¹⁴ and H³ seed planted shortly after harvest developed into normal-looking plants. After storage for 44 weeks, both the C¹⁴ and H³ seed lots germinated but the former failed to survive. Seedlings from H³ seed stored for 44 weeks grew normally except for some leaf-pigment anomalies in the primary leaves.

1900 • Effect of Variety on the Accumulation of Strontium-90 in Wheats and Their Milled Products

R. A. ANDERSON and V. F. PFEIFER

Radiol. Health Data 6(8): 438-440. August 1965

Information presented shows that pickup of strontium-90 from fallout and soil absorption depends on wheat variety, as well as location. Milled products from two varieties grown in one location under identical growing conditions, but exhibiting

high and low levels of strontium-90 pickup, showed significant differences in the strontium-90 in the shorts and bran fractions; the flours were about the same.

1901 • Starch-Derived Polyethers for Rigid Urethane Foams

[F. H. OTEY] North. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., CA-71 -29, 6 pp. November 1965. [Processed]

Based on a process developed at the Northern Division, Archer Daniels Midland Company of Minneapolis, Minn. under a research contract completed the pilot-plant and engineering development. Up to 1,000-pound batches of polyethers were prepared by reacting starch with ethylene glycol followed by

propoxylation. Experimental rigid urethane foams from the starch-based polyethers were prepared on a foam machine pouring at the rate of 45 to 50 pounds per minute. A flowsheet of the pilot-plant process and a complete description of materials and properties are given.

1902 • Quantitative Determination of Monosaccharides as Their Alditol Acetates by Gas Liquid Chromatography

JAWAHAR S. SAWARDEKER, JAMES H. SLONEKER, and ALLENE JEANES
Anal. Chem. 37(12): 1602-1604. November 1965

A complete and quantitative separation has been achieved by gas-liquid chromatography on a single liquid phase of fully acetylated forms of 10 alditols: glycerol, erythritol, rhamnitrol, fucitol, ribitol, arabitol, xylitol, mannitol, dulcitol, and sorbitol. The liquid phase was a copolymer of ethylene glycol-succinate polyester and nitrile silicone polymer.

This separation provides a sensitive and accurate method for the quantitative analysis of complex glucose mixtures because reduction to the corres-

ponding alditols eliminates the multiplicity of peaks produced for each monosaccharide because of anomerization. The method is based on the quantitative reduction of glucose mixtures with sodium borohydride and acetylation of the alditols by refluxing with pyridine and acetic anhydride (1:1). Quantitative gas chromatography of the resulting alditol acetates with xylitol as the internal standard showed an accuracy of $100 \pm 2\%$ for the glucose mixtures. The behavior of alditol acetates on other liquid phases is also reported.

1903 • A Comparison of Participating Solvents During Ozonization

D. J. MOORE, E. H. PRYDE, and J. C. COWAN
J. Am. Oil Chemists' Soc. 42(10): 894-898. October 1965

Sixteen different participating solvents and certain combinations of them were evaluated for their effects on the conversion of methyl oleate to carbonyl compounds by ozonolysis. Depending upon the alcohol or carboxylic acid used as the single solvent, chemical reduction with zinc and acetic acid gave yields of 70 to 100%; catalytic hydrogenation with 10% palladium on charcoal, 62 to 84%. When equimolar mixtures of an acid and a primary, un-

hindered alcohol were used, catalytic hydrogenation gave yields of 94 to 98%. In preparative-scale experiments, catalytic hydrogenation gave 98% yields of methyl azelaaldehyde in the representative solvent combinations of 2-methoxyethanol/acetic acid and 1-butanol/propionic acid. When anhydrous calcium sulfate was used as a drying agent for aldehyde/alcohol solutions, significant acetal was formed in the absence of other catalysts.

1904 • Reversible Reduction and Reoxidation of the Disulfide Bonds in Wheat Gliadin

A. C. BECKWITH, J. S. WALL, and R. W. JORDAN
Arch. Biochem. Biophys. 112(1): 16-24. October 1965

Gliadin, reduced with β -mercaptoethanol at pH 7.4 in solution of 6 M urea, was reoxidized in acid solvents at 0.1% protein concentration. The product obtained had the same chemical and physical properties as the original gliadin. Evidently disulfide bonds in gliadin are predominantly intramolecular and are determined by conformations stabilized by

noncovalent interactions of amino acid side chains in the individual protein molecules. When the urea concentration of the solvent used during reduction was decreased or when the protein concentration present during reoxidation was increased, the reoxidized product appeared to contain predominantly intermolecular disulfide bonds.

1905 • Optical Rotatory Dispersion Studies on Wheat Gluten Proteins; Gluten, Glutenin, and Gliadin in Urea and Hydrochloric Acid Solutions

Y. VICTOR WU and JAMES E. CLUSKEY

Arch. Biochem. Biophys. 112(1): 32-36. October 1965

Conformations of gluten, glutenin, and gliadin were studied by optical rotatory dispersion in 3 M urea plus buffer at several pH values and in 0.002 N HCl. Wavelength ranged from 600 to around 220 m μ or lower. A significant negative Cotton effect at 233 m μ was observed for each protein in all solvents studied. Values of b_0 from Moffitt-Yang plots were interpreted conventionally ($b_0 = -630$ for 100%

right-handed α -helix). Optical rotatory dispersion data were also treated by a modified two-term Drude equation according to the method of Shechter and Blout. The results indicate that gliadin contains more α -helix than glutenin and that all three proteins contain more α -helix in hydrochloric acid than in urea solutions. Glutenin and gliadin are probably mixtures of random coil and helix.

1906 • Amines from Aldehydes Derived from the Ozonization of Soybean Esters

D. E. ANDERS, E. H. PRYDE, and J. C. COWAN

J. Am. Oil Chemists' Soc. 42(10): 824-827. October 1965

Investigations were carried out on reductive amination of caproaldehyde, pelargonaldehyde and azelaaldehyde esters, obtainable from ozonolysis of soybean oil products, with ammonia and hydrogen in the presence of nickel catalyst. A solvent system giving good yields of primary amine while suppressing amide formation was devised. Excess ammonia and homogeneous solutions suppressed secondary amine formation. Nonpolar solvents suppressed ammonolysis. Optimum conditions for reaction var-

ied with the aldehyde.

Excellent yields of hexylamine (91%), nonylamine (90%), methyl 9-aminononanoate (92%), and butyl 9-aminononanoate (93%) were obtained from caproaldehyde, pelargonaldehyde, methyl azelaaldehyde, and butyl azelaaldehyde, respectively, when aminated in anhydrous ammonia and either cyclohexane or methyl cyclohexane.

1907 • Preparation of Alcohols from Cyclic Fatty Acids

E. W. BELL, J. P. FRIEDRICH, L. E. GAST, and J. C. COWAN

J. Am. Oil Chemists' Soc. 42(10): 876-878. October 1965

Saturated C₁₈- and C₂₀-cyclic alcohols have been prepared by catalytic hydrogenation of methyl esters from cyclized linseed monomeric acids, purified saturated C₁₈-cyclic acids, the ethylene adduct of conjugated soybean fatty acids, and the ethylene adduct of conjugated octadecadienoic acids. The cyclic alcohols have also been prepared from free acids of crude cyclic linseed, cyclic linseed monomeric, and the ethylene adduct of 9,11-t, t-octadecadienoic. Conversion of esters and acids was

88 to 99% by hydroxyl determination; by gas-liquid chromatography, almost quantitative. Hydrogenations were carried out with 10%, by weight, copper chromite catalyst, an initial hydrogen pressure of 2,100 p.s.i., and a temperature of 280°C. for 3 to 5 hours.

Preliminary evaluations indicate that saturated C₁₈- and C₂₀-cyclic alcohols have a potential use in cosmetic formulations.

1908 • **Methods for Determining Thioglucosides in *Crambe abyssinica***

J. E. MCGHEE, L. D. KIRK, and G. C. MUSTAKAS

J. Am. Oil Chemists' Soc. 42(10): 889-891. October 1965

Four methods are described for the determination of thioglucosides in *Crambe abyssinica*: sulfate ion, sulfur balance, silver complexing, and hot-water extraction. The analytical results of all four methods agree closely as to the thioglucoside content in dehulled, defatted meal, from 11 to 12%. Any

one of these methods should be useful in studying new plant species because approximate thioglucoside content is obtained even though the specific thioglucosides and isothiocyanates involved may not be known.

1909 • **Prepress-Solvent Extraction of Crambe: First Commercial Trial Run of New Oilseed**

G. C. MUSTAKAS, G. KOPAS,¹ and N. ROBINSON¹

(¹Pacific Vegetable Oil Corporation, San Francisco, Calif.)

J. Am. Oil Chemists' Soc. 42(10): 550A, 552A, 554A, 594A. October 1965

Commercial-scale equipment was used to process experimentally 36 tons of *Crambe abyssinica* seed grown in the western part of the United States to obtain information on the processing of this new oilseed and to determine characteristics of the oil and meal products. The run was carried out for USDA at the Pacific Vegetable Oil Corporation plant at Sidney, Nebraska, February 1964.

Process objectives in the study included dehulling, primary oil removal by expeller prepress, secondary oil removal by solvent extraction, and

control of thioglucosides to obtain good oil quality. A continuous plant operation yielded crude oils and toasted meal that will be compared with similar products from other commercial oilseed processes.

Characteristics of the crude oils that have been determined are composition, refining losses, and hydrogenation ability. Organoleptic data on the refined, bleached, and deodorized oils have been obtained, as well as compositional data on the desolventized-toasted meals. More than 13 tons of meal and 10 tons of oil were prepared.

1910 • **A Chemical Model for Electrolytic Oxidation of Iodate**

EARL B. LANCASTER and ROYDEN O. BUTTERFIELD

Nature 207(5002): 1193-1195. September 11, 1965

The classic formulation of the iodate reaction as a chemical reaction has been examined by means of an analog computer and was found to fit the data if it were assumed that the precursor material had an

initial value greater than zero. The results were nearly identical with those previously obtained with an approximate model, except in the early stages of some of the oxidation reactions.

1911 • Effects of Antimicrobial Agents on the Milky Disease Bacteria Bacillus popilliae and Bacillus lentimorbus

T. G. PRIDHAM, H. H. HALL, and R. W. JACKSON

Appl. Microbiol. 13(6): 1000-1004. November 1965

The effects of antibiotics, sulfonamides, and other antimicrobial agents on vegetative cultures of five strains of milky disease bacteria were compared with those on Bacillus subtilis Cohn emend. Prazmowski, Staphylococcus aureus Rosenbach, Sarcina lutea Schroeter, Escherichia coli (Migula) Castellani and Chalmers, Saccharomyces pastorianus Hansen, and Mucor ramannianus Moel. Similar numbers of viable cells of each organism were exposed to the test materials by use of an antibiotic-sensitivity disc method adapted from techniques recommended by the Food and Drug Administration.

The results suggest that vancomycin or ristocetin, as well as a few other materials, might be useful in controlling contamination either during culture of the fastidious milky disease bacteria or in large populations of vegetative cells undergoing treatment to induce sporulation. Inhibitory concentrations of vancomycin and ristocetin in shaken-tube tests were much lower than expected in comparison with results of sensitivity-disc tests on the milky disease bacteria. Sublethal concentrations of the two antibiotics elicited some morphological change in the bacteria.

1912 • Search for New Industrial Oils. XIII. Oils from 102 Species of Cruciferae

ROGER WAYNE MILLER, F. R. EARLE, I. A. WOLFF, and QUENTIN JONES¹

(¹USDA Crops Research Div., Beltsville, Md.)

J. Am. Oil Chemists' Soc. 42(10): 817-821. October 1965

Seed from additional species of Cruciferae have been analyzed for crude protein, oil, and fatty acids in the oil. Oils were like those reported earlier from other crucifers, except for Cardamine impatiens which is unique among known seed oils because it contains some 25% dihydroxy acids.

Erucic acid is present (0.3 to 55%) in about three-fourths of the 102 samples. Eicosenoic acid is a major constituent (32 to 53%) in four species and monohydroxy acids (45 to 72%) in another four. Linolenic acid occurs (2 to 66%) in oil of all species.

1913 • Evaluation of Seed Galactomannans from Cassia Species as Paper Additives

H. L. TOOKEY and T. F. CLARK

Tappi 48(11): 625-626. November 1965

Galactomannan gums from seed of Cassia marilandica and C. occidentalis were evaluated as wet-end additives. Both gums were comparable to guar gum in their effects on burst, tensile strength, fold, opacity, and porosity properties when they were

added to softwood unbleached kraft pulp and softwood bleached sulfite pulp. The results indicate that galactomannan gums with similar mannose:galactose ratios are effective wet-end additives regardless of their particular plant source.

1914 • Effect of Carbonyl Content of Cationic Dialdehyde Starches on Wet Strength of Paper

T. E. YEATES and C. L. MEHLTRETTER

Tappi 48(11): 655-656. November 1965

Newly prepared dialdehyde starches (DAS) of 5 to 96% carbonyl content were simultaneously cationized and dispersed in water by reaction with betaine hydrazide hydrochloride, and the DAS-hydrazones formed in situ were evaluated as wet-end wet-strength paper additives. The dispersions were used within 2 to 3 hours of preparation to make handsheets from unbleached softwood sulfate pulp to determine wet- and dry-tensile strengths. Based on the content of underivatized carbonyl groups, DAS produced by 5 to 20% periodate oxidation of corn starch were the most effective in increasing wet

strength. However, wet-strength production was directly related to carbonyl content of the additive and was highest with the 96% DAS. In general, dispersion time at 92°C. was critical for obtaining maximum wet strength in paper. Improvement in dry strength by addition of DAS-betaine hydrazone dispersions appeared to be unrelated to available carbonyl content of the hydrazones. A preliminary study indicated that aging the cationic-DAS dispersions before application greatly increases the wet-tensile strength of paper.

1915 • Preparation and Properties of Glycol Glycoside Polyethers for Rigid Urethane Foams

F. H. OTEY, BONNIE L. ZAGOREN, FLORENCE L. BENNETT, and C. L. MEHLTRETTER

Ind. Eng. Chem., Prod. Res. Develop. 4(4): 224-227. December 1965

Reproducibility of viscosities and hydroxyl numbers of glycol glycoside polyethers was achieved through control of process variables. A series of six glycoside mixtures, prepared at 125° to 130°C., with 0.7% acid catalyst and a reaction time of 30 minutes, was etherified with 7 moles of propylene oxide per anhydroglucose unit. The polyethers had average deviations in hydroxyl numbers of ± 2 and

in viscosities of +1700 centipoises. Recovery of excess ethylene glycol by distillation from the glycoside mixture was nearly quantitative, and its reuse, without purification, did not affect polyether properties. The preparation and properties of the glycoside-based polyethers are within the limits of commercial acceptability for use in rigid urethane foam production.

1916 • Separation of Isomeric Glycosides Produced by Transglycosylation of Starch with Ethylene Glycol

F. H. OTEY, FLORENCE L. BENNETT, BONNIE L. ZAGOREN, and C. L. MEHLTRETTER

Ind. Eng. Chem., Prod. Res. Develop. 4(4): 228-230. December 1965

An acid-catalyzed reaction of starch with ethylene glycol at 120° to 130°C. yields a mixture of isomeric glycosides that has potential for use as an industrial polyol. The major glycosides present were separated by carbon-Celite column adsorption followed by gradient elution. Course of the elution was determined by thin-layer chromatography. 2-Hydroxyethyl α -D-glucopyranoside was eluted with water and crystallized from the concentrated solu-

tion. The corresponding β -glucoside was removed from the column with 3.7% ethanol. A third product, isolated after elution with 6% ethanol, was identified as ethylene bis(α -D-glucopyranoside). Quantitative gas chromatographic analysis showed that the crude glycoside mixture contained 45 to 48% 2-hydroxyethyl α -D-glucopyranoside, 21 to 24% β -anomer, and at least 11% ethylene bis(α -D-glucopyranoside).

1917 • A C₂₆-Keto-Acid from the Oil of *Cuspidaria*

C. R. SMITH, JR. and R. W. MILLER

Chem. Ind. (London) (46): 1910. November 13, 1965

The seed oil of *Cuspidaria* cf. *pterocarpa* (Cham.) DC. (Bignoniaceae) contains a series of new keto fatty acids. One of these represents about 16% of the

total fatty acids of this oil and has the structure 17-oxo-cis-20-hexacosenoic acid.

1918 • Wet-Milling Characteristics of Class 8 Amylomaize

R. A. ANDERSON

Cereal Chem. 42(6): 580-581. November 1965

Processing data are presented on the wet milling of high-amylose corn containing 80% apparent amylose. Indications are that this new corn will

process about the same as other commercial amyl-omaizes.

1919 • Publications and Patents of the Northern Utilization Research and Development Division, January-June 1965

North. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., Unnumb. Pub., 40 pp. July 1965

1920 • Plant Fibers in the Paper Industry

T. F. CLARK

Econ. Botany 19(4): 394-405. October-December 1965

Various aspects briefly discussed include the historical background concerning the use of fibrous plants for pulp and papermaking; the chemical and physical properties that contribute to their utility;

the nonwoody fibrous plants currently in commercial use; and the USDA program to discover new fibrous crops suitable for pulping industrially.

1921 • Evaluation of Enzyme-Modified, Solvent-Extracted Crambe Seed Meal by Chemical Analyses and Rat Feeding

H. L. TOOKEY, C. H. VanETTEN, J. E. PETERS, and I. A. WOLFF
Cereal Chem. 42(6): 507-514. November 1965

A method is presented for the removal of thioglucosides (as their hydrolysis products) from crambe seed meal. Defatted meal is wetted to allow native myrosinase to hydrolyze the thioglucosides. Solvent extraction of the wet meal leads to a product free of thioglucosides, the organic aglycones (R)-goitrin and (+)-1-cyano-2-hydroxy-3-butene (and other $C\equiv N$ compounds), and essentially free of the bitter substance, sinapine. Similar meals may be prepared directly from autolyzed full-fat flakes by employing mixed solvents which remove the products described above as well as the oil. The extracted

meals range from 45 to 56% crude protein and contain approximately 6.0 g. lysine per 16 g. N, 2.0 g. methionine, and 2.2 g. cystine. Processed meal prepared from defatted crambe seed was fed to rats at 28% of the diet. The meal supports growth at 88% of the controls during a 13-week period. Organ weights of the test animals were not significantly different from those of the control animals. Histological examination of the organs revealed no abnormalities. Feeding autolyzed, but unextracted, meals at the 28% level caused death of all animals within 2 weeks.

1922 • Dihydroxy Fatty Acids in Cardamine impatiens Seed Oil

K. L. MIKOLAJCZAK, C. R. SMITH, JR., and I. A. WOLFF
J. Am. Oil Chemists' Soc. 42(11): 939-941. November 1965

The oil of Cardamine impatiens L. (Cruciferae) seed includes glycerides belonging to a series of saturated long-chain vicinal dihydroxy fatty acids, which make up 25% by weight of the mixed fatty acids. The mixture of diols, after transesterification of the oil with methanol, can be crystallized from an ether solution of the mixed methyl esters

and has the following composition: methyl 13,14-dihydroxydocosanoate, 66%; methyl 15,16-dihydroxytetracosanoate, 24%; methyl 9,10-dihydroxyoctadecanoate, and methyl 11,12-dihydroxyeicosanoate, about 5% each. Chemical proof is presented showing that essentially all the diols have the erythro configuration.

1923 • Microbial Carotenogenesis

ALEX CIEGLER

Advan. Appl. Microbiol. 7: 1-34. 1965

Carotenoid pigments are found in many microorganisms but appear to have taxonomic significance only in algae. Their biosynthesis involves production of a C_{40} polyene, which undergoes sequential desaturation followed by cyclization to form the various carotenes. Xanthophylls are probably synthesized

from their corresponding carotenes. Fermentation processes have been developed for production of β -carotene based on mated cultures of Blakeslea trispora and for xanthophylls based primarily on green algae.

1924 • Reaction of Gramicidin with Bacterial Chromatophores

J. W. NEWTON

Biochem. Biophys. Acta 109(1): 302-303. September 1965

A method for evaluating the extent of coupling of photochemical processes to phosphorylation is described, based on assay of the induction period in disulfide photoreduction by chromatophores of Rhodospirillum rubrum. With this assay, photoreduction and photophosphorylation are essentially competitive. Coupling can be evaluated by studying the extent of such competition.

The coupling relationship of various electron-transfer systems was studied with a variety of

structurally related electron donors and acceptors. Evidently coupling is strongly under the control of electrostatic forces. Data also suggest that while electron transfer may be coupled to phosphorylation, simultaneous electron and proton transfer from a donor is not. In some respects, data tend to support the concept, discussed by others, that a spatial separation of charge is a prime requisite for maintenance of energy coupling in electron-transport processes.

1925 • Instrumental Study of Aldehyde Oils and Their Reaction with Selected Amines

R. E. SHARPE,¹ D. A. BERRY,¹ E. H. PRYDE, and J. C. COWAN(¹Battelle Memorial Institute, Columbus, Ohio)

J. Am. Oil Chemists' Soc. 42(10): 835-838. October 1965

Unsaturated aldehyde oils prepared by partial ozonization of soybean oil gave infrared and nuclear magnetic resonance spectra in qualitative accord with the structures expected. Infrared spectra indi-

cated that the unsaturation present was in the trans form. Reactions of dialdehyde oil with various amines proceeded with surprising ease at room temperatures to give facticelike, crosslinked products.

1926 • Laballenic Acid. A New Allenic Acid from Leonotis nepetaefolia Seed Oil

M. O. BAGBY, C. R. SMITH, JR., and I. A. WOLFF

J. Org. Chem. 30(12): 4227-4229. December 1965

Seed oil from Leonotis nepetaefolia contains 16% of laballenic [(-)-5,6-octadecadienoic] acid. This is the first example of a natural C₁₈ allene from higher plants. An anomalous result with periodate-

permanganate oxidation was found in which glutaric acid, an expected cleavage product, was not detected. Laballenic acid is very stable to alkali.

1927 • Cyanoethylated Starches and Dextrins as Coating Adhesives

T. E. YEATES, M. E. CARR, C. L. MEHLTRETTER, and B. T. HOFREITER

Tappi 48(9): 509-512. September 1965

Results of laboratory investigations are described on the use of cyanoethyl starch derivatives as coating adhesives. An acid-modified starch and a dextrin were cyanoethylated to achieve a degree of substitution in the range of 0.006 to 0.16. Adhesives prepared from these products had excellent clarity and viscosity characteristics suitable for paper-coating mixtures. Their pigment-binding properties were

superior to those of several quality grades of commercial starch adhesives. Principal advantage of the cyanoethylated products is their ability to maintain high wax pick resistance for a given adhesive-to-clay ratio in coating mixtures having a broad range of solids content. They also have high-shear rheological properties desirable in coating mixtures of 40 to 60% solids.

1928 • Detection and Quantitative Determination of Anhydroglycoses by Gas Chromatography

J. S. SAWARDEKER, J. H. SLONEKER, and R. J. DIMLER
J. Chromatog. 20(2): 260-265. November 1965

A rapid method for detection and quantitative determination of several anhydroglycoses has been achieved by using gas chromatography on an 8-foot column. The anhydroglycoses used include 1,6-anhydro- β -D-galactopyranose, 1,6-anhydro- α -D-galactofuranose, 1,6-anhydro- β -D-glucopyranose,

1,6-anhydro- β -D-glucofuranose. The method, applicable for the quantitative determination of anhydroglycoses formed during vacuum pyrolysis of starch and dextran, is sensitive enough to detect less than 1% of anhydroglycoses in pyrolysis products.

1929 • Gas-Solid Chromatography of Hydrocarbons on Activated Alumina

G. R. LIST, R. L. HOFMANN, and C. D. EVANS
J. Am. Oil Chemists' Soc. 42(12): 1058-1060. December 1965

Volatile hydrocarbons, representative of those in autoxidizing fats, were analyzed on a single column of activated alumina by gas-solid adsorption chromatography (GSC). Mixtures of C₁ to C₈ paraffins and α -olefins were readily separated from one another and from several branched hydrocarbons in less than 40 minutes. Semilog plots of carbon number versus log retention time for these individual mixtures indicate that good separations may be expected when all components are present simultaneously. Alumina is a unique chromatographic substrate for these separations. Since no liquid

phase is employed, wide temperature ranges may be applied, column bleeding is eliminated, and the system becomes ideal for temperature programming even on single column instruments. This system of GSC offers a convenient and direct method for hydrocarbon analysis since more polar materials, such as aldehydes, ketones, and esters, are irreversibly adsorbed on alumina. It shows promise not only for the analysis of volatiles in the flavor evaluation of edible oils, but also as an aid in solving many other food and biological problems.

1930 • Preparation of Linseed Acid Chlorides

E. J. DUFEK, L. E. GAST, and W. J. DeJARLAIS
J. Am. Oil Chemists' Soc. 42(12): 1060-1062. December 1965

A method is described for the preparation of linseed acid chlorides in excellent yields and functional purity. After linseed acids are reacted with phosphorus trichloride, the mixture is briefly heated

in vacuo, cooled, and decanted. The linseed acid chlorides were also distilled in a specially modified molecular still to obtain a nearly colorless product.

1931 • Preparation of Some Linseed Esters of Methyl α -D-Glucopyranoside Using the Methoxycarbonyl Blocking Group

E. J. DUFEK and W. J. DeJARLAIS

J. Am. Oil Chemists' Soc. 42(12): 1104-1110. December 1965

The three possible methoxycarbonyl derivatives of methyl 4,6-O-benzylidene- β -D-glucopyranoside have been prepared. The methoxycarbonyl at the C₂ position in the 2,3-di-O-methoxycarbonyl derivative is removed selectively in anhydrous ammonia. The ability of the methoxycarbonyl group to block selec-

tively the C₂ hydroxyl in methyl glucoside has been utilized to synthesize some mono-, di-, and trilinseed esters of methyl glucoside. The use of this new blocking group has permitted the first synthesis of some unsaturated esters of methyl glucoside.

1932 • Production of Cyclic Fatty Acids: Water as the Reaction Solvent

R. E. BEAL, R. A. EISENHAUER, and V. E. SOHNS

J. Am. Oil Chemists' Soc. 42(12): 1115-1119. December 1965

In an attempt to lower processing costs of producing cyclic fatty acids by a high-temperature alkali treatment, water was tested as the reaction solvent instead of ethylene glycol, previously used. Based on extensive tests in a high-pressure autoclave, saturated cyclic (cyclohexanoic) fatty acids were pro-

duced under economic reaction conditions, including a temperature of about 300° C., a 4:1 solvent ratio, and 50% excess sodium hydroxide catalyst. The lower yield of saturated cyclic fatty acids by the water process is more than offset by fewer steps and reduced evaporation costs.

1933 • Hydrogenation of Linolenate. XII. Effect of Solvents on Selectivity

SAMBASIVARAO KORITALA and H. J. DUTTON

J. Am. Oil Chemists' Soc. 42(12): 1150-1152. December 1965

Selectivity of heterogeneous catalysts for hydrogenation of linolenate over linoleate is increased by the presence of certain polar solvents. A ratio of specific reaction rate constants for linolenate to linoleate of 4 was obtained with a 5% palladium-on-alumina catalyst when dimethyl formamide (DMF)

was used as the solvent. This high selectivity of DMF was independent of temperature and catalyst concentration. Other solvents that improved selectivity include furfural, acetonitrile, tetramethyl urea, and trimethyl phosphate.

1934 • Optical Rotatory Dispersion and Absolute Configuration. VI. Structure and Absolute Configuration of Helenynolic Acid

J. CYMERMAN CRAIG,¹ S. K. ROY,¹ R. G. POWELL, and C. R. SMITH, JR.
(¹University of California, San Francisco)

J. Org. Chem. 30(12): 4342-4343. December 1965

Helenynolic acid (9-hydroxy-trans-10-octadecen-12-ynoic acid) was recently isolated from Heli-chrysum bracteatum. The rotatory dispersion curve of methyl helenynolate shows two closely spaced positive Cotton effects, with peaks at 232 and 243 m μ , superimposed on a strong positive background. This effect is in excellent agreement with the

vinylacetylene chromophore of methyl helenynolate. Its hydrogenation gave a saturated ester identified as methyl 9-D-hydroxyoctadecanoate by comparison with a synthetic sample of methyl 9-D-hydroxyoctadecanoate. Thus, helenynolic acid also has the D configuration.

1935 • Physiological Properties of Soybean Trypsin Inhibitors and Their Relationship to Pancreatic Hypertrophy and Growth Inhibition of Rats

J. J. RACKIS

Federation Proc. 24(6): 1488-1493. November-December 1965

Comparison of feeding tests with soybean trypsin inhibitor and protein fractions having high trypsin inhibitor activity indicates that the trypsin inhibitors account for approximately 30 to 50% of the growth-inhibitory effect of raw meal and for nearly all of the pancreatic hypertrophic response. Low-molecular weight components of raw meal also inhibit rat growth and cause pancreatic hypertrophy but to a lesser extent.

Pancreatic hypertrophy is a sensitive physiological response particularly in young rats. Significant pancreatic hypertrophy occurs in only 9 days of feeding. The dietary level of raw meal is the most important factor that determines the extent of pancreatic hypertrophy, regardless of age of rat and length of feeding.

REPUBLICATION

1566* • Progress in Technology of Vital Wheat Gluten and Wheat Starch Manufacture

ROY A. ANDERSON

Bull. Res. Assoc. Brit. Flour-Millers 16(2): 43-56. April 1965

Originally published as "Progressi nella Tecnologia della Fabbricazione di Glutine Vitale e di

Amido di Frumento" in Quaderni di Merceologia 1(1): 69-88. 1962.

1839 • Exploring the Structure of Proteins in Wheat Gluten

R. J. DIMLER

Baker's Dig. 39(5): 35-38, 40-42. October 1965

Originally published in the Proceedings of the Third National Conference on Wheat Utilization Research, held at Manhattan, Kansas, November 5-7,

1964, which were prepared by the Western Utilization Research and Development Division as U.S. Agr. Res. Serv., ARS-74-31, pp. 141-152. April 1965.

CONTRACT AND GRANT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

144-C • Infrared Emission Spectra of Fatty Acids on Steel Surfaces

M. J. D. LOW and H. INOUE

Rutgers, The State University, New Brunswick, N. J.

Can. J. Chem. 43(7): 2047-2051. July 1965

145-C • Use of Dye Binding Method for Protein Estimation in Cruciferae Meals

K. J. GOERING and JERRY YAO

Montana State College, Bozeman

Proc. Montana Acad. Sci. 24: 59-60. 1964

146-C • The Catalytic Properties of Vermiculite

M. J. D. LOW, P. L. BARTNER, and R. KRISHNAMURTHY

Rutgers, The State University, New Brunswick, N. J.

J. Res. Inst. Catalysis, Hokkaido Univ. 13(1): 66-70. July 1965

147-C • Solubility of Dialdehyde Starch in Various Dilute Solutions

LIONEL K. ARNOLD, R. BASU ROY CHOUDHURY, and HARRY C. ROBERTS

Iowa State University, Ames

Proc. Iowa Acad. Sci. 71: 188-192. 1965

148-C • The Solubility of Wheat Gluten in Various Aqueous Solutions

LIONEL K. ARNOLD, R. BASU ROY CHOUDHURY, and DEVENDRALAL C. DANGORIA

Iowa State University, Ames

Proc. Iowa Acad. Sci. 71: 193-196. 1965

149-C • A Search for High Erucic Acid Containing Oils in the Cruciferae

K. J. GOERING, ROBERT ESLICK, and D. L. BRELSFORD

Montana State College, Bozeman

Econ. Botany 19(3): 251-256. July-September 1965

- 151-C● Preparation and Polymerization of Vinyl Esters of Chloro- and Hydroxystearic and Eicosanoic Acids**
 C. S. MARVEL,¹ J. H. GRIFFITH,¹ J. L. COMP,¹ T. H. APPLEWHITE,² and L. A. GOLDBLATT²
¹University of Arizona, Tucson; ²West. Util. Res. Develop. Div., Albany, Calif.
 J. Polymer Sci., Part A, 3(8): 2991-3001. August 1965
- 152-C● Recovery of Alpha-Ketoglutaric Acid from Crude Fermentation Liquors**
 E. R. ERICKSON, R. A. BERNTSEN, M. A. ELIASON, and M. E. PETERSON
 Augustana Research Foundation, Rock Island, Ill.
 J. Agr. Food Chem. 13(5): 452-455. September-October 1965
- 153-C*● Concrete Curing and Surface Protection with Linseed Oil**
 CHARLES H. SCHOLER and CECIL H. BEST
 Kansas State University, Manhattan
 Kansas Eng. Exp. Station, Special Rept. 60, 22 pp. July 1965. [Processed]
- 154-C*● Intracellular Regulation of Sporulation of Bacteria**
 V. R. SRINIVASAN
 University of Illinois, Urbana
In "Spores III," eds. L. L. Campbell and H. O. Halvorson, a symposium sponsored by University of Illinois with the support of the Office of Naval Research, at Allerton Park, Illinois, October 2-4, 1964, pp. 64-74. Am. Soc. Microbiol., Ann Arbor, Mich. 1965
- 155-C● Polymerization Studies with Vinyl Esters of Acids Derived from Agricultural Products**
 C. S. MARVEL and J. H. GRIFFITH
 University of Arizona, Tucson
 J. Agr. Food Chem. 13(5): 402-405. September-October 1965
- 156-C● Polymerization of Vinyl Esters of Cyclic Acids**
 J. H. GRIFFITH, J. L. COMP, and C. S. MARVEL
 University of Arizona, Tucson
 J. Polymer Sci. A3(10): 3659-3661. October 1965
- 158-C● Terpolymers of Ethylene and Propylene with d-Limonene and β -Pinene**
 RALPH W. MAGIN, C. S. MARVEL, and EDWARD F. JOHNSON
 University of Arizona, Tucson
 J. Polymer Sci., Part A, 3(11): 3815-3823. November 1965

[Report of research work done by an outside agency under a grant from the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 3-G • **Conformational and Configurational Studies on Some Acetylated Aldopyranosyl Halides**
DEREK HORTON and WILLIAM N. TURNER
The Ohio State University, Columbus
J. Org. Chem. 30(10): 3387-3394. October 1965

[Report of research work supported with funds provided by the U.S. Department of Agriculture under the authority of U.S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]

- 81-F • **Studies on Dextran and Dextran Derivatives. Note V. Stability to Heat of Dextran in Aqueous Solution**
B. MONDOVI, A. M. WOLF, P. TURINI, and A. ROSSI FANELLI
University of Rome, Rome, Italy
Ital. J. Biochem. 13(6): 401-405. November-December 1964
- 82-F • **Physiological Aspects of Host Specificity in the Bruchidae—IV. Developmental Incompatibility of Soybeans for Callosobruchus**
S. W. APPLEBAUM, B. GESTETNER, and Y. BIRK
Hebrew University, Rehovoth, Israel
J. Insect Physiol. 11(6): 611-616. June 1965
- 83-F • **Syncephalis depressa from India**
B. S. MEHROTRA and R. PRASAD
University of Allahabad, Allahabad, India
Mycologia 56(6): 905-908. November-December 1964

- 84-F • **Enzymic Transfer of 1→6-Linked α -Maltosyl Residues by an Enzyme Preparation from Sweet Corn**
PAMELA M. TAYLOR and W. J. WHELAN
Royal Free Hospital School of Medicine, London, England
Biochem. J. 95(2): 26-27. February 1965
- 85-F • **An Enzymic Impurity in Crystalline Sweet-Potato β -Amylase**
E. Y. C. LEE and W. J. WHELAN
Royal Free Hospital School of Medicine, London, England
Biochem. J. 95(2): 27. February 1965
- 86-F • **Soybean Saponins. IV. The Effect of Proteins on the Inhibitory Activity of Soybean Saponins on Certain Enzymes**
ISAAC ISHAAYA and YEHUDITH BIRK
Hebrew University, Rehovoth, Israel
J. Food Sci. 30(1): 118-120. January-February 1965
- 87-F • **The Proteolytic Enzymes of Japanese Koji and Taka-Diastase**
JACOB ILANY-FEIGENBAUM
Bar-Ilan University, Ramat-Gan, Israel
J. Food Sci. 30(1): 148-150. January-February 1965
- 88-F • **Soya Bean Saponins. Part V. Soyasapogenol E**
D. WILLNER,¹ B. GESTETNER,² D. LAVIE,¹ Y. BIRK,² and A. BONDI²
¹Weizmann Institute of Science; ²Hebrew University, Rehovoth, Israel
J. Chem. Soc., Suppl. 1, 1964: 5885-5888.
- 89-F • **Systematic Analysis of Sterols in Soybeans and Other Oil Seeds**
TOSHIKO KIRIBUCHI, CHEA SAN CHEN, and SABURO FUNAHASHI
University of Tokyo, Tokyo, Japan
Agr. Biol. Chem. (Tokyo) 29(3): 265-267. March 1965
- 90-F • **Trace Elements in Edible Fats. IX. Influence of Demetalization on the Oxidative and Flavor Stabilities of Soybean Oil**
A. VIOQUE, R. GUTIERREZ, M. A. ALBI, and N. NOSTI
Institute of Fats, Seville, Spain
J. Am. Oil Chemists' Soc. 42(4): 344-345. April 1965

- 91-F • **Effect of Moisture Content of Wheat and Flour on Endosperm Breakdown and Protein Displacement**
N. L. KENT
Research Association of British Flour-Millers, St. Albans, Herts., England
Cereal Chem. 42(2): 125-139. March 1965
- 92-F • **Studi sul Destrano e Derivati del Destrano. VI. Effetto del Destrano sulla Solubilità della γ -Globulina**
[Study of Dextran and the Derivatives of Dextran. VI. Effect of Dextran on Solubility of the γ -Globulin]
P. TURINI and M. R. BRUZZESI
University of Rome, Rome, Italy
Boll. Soc. Ital. Biol. Sper. 40(24): 1985-1987. December 1964
- 93-F • **Oscillating Mirror System for Recording Optical Densities from the Spinco Model E Analytical Ultracentrifuge**
S. P. SPRAGG, S. TRAVERS and T. SAXTON
University of Birmingham, Birmingham, England
Anal. Biochem. 12(2): 259-270. August 1965
- 94-F • **Antioxidants in Oats: Diferulates of Long-Chain Diols**
D. G. H. DANIELS and H. F. MARTIN
Research Association of British Flour Millers, St. Albans, Herts., England
Chem. Ind. (London) (42): 1763. October 16, 1965
- 95-F • **Fractionation of Linseed Oil Fatty Acids by Crystallization**
ERKKI UKSILA, PAAVO ROINE, EEVA-LIISA SYVÄÖJA, and ARMI ALIVAARA
University of Helsinki, Helsinki, Finland
Acta Chem. Scand. 17(10): 2622-2627. 1963
- 96-F • **Presence of Maltodextrins in Potato Phosphorylase Preparations**
J. WATKINS, D. E. NORMANSELL, and G. A. GILBERT
University of Birmingham, Birmingham, England
Nature 207(4999): 857-858. August 21, 1965

July-December 1965

• • • • •

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased (50 cents each) from the Commissioner of Patents, U.S. Patent Office, Washington, D.C. 20231. Order by number, do not send stamps.]

Alkali-Stable Thin-Boiling Starches and Method of Making Same

WILBUR C. SCHAEFER and CHARLES R. RUSSELL

U. S. Patent 3,193,409. July 6, 1965

Thin-boiling starch granules having markedly increased stability to alkaline additives are obtained by slurring unmodified starch in a 1 to 5% by weight solution of either anhydrous chlorine or of

anhydrous hydrogen chloride in anhydrous methanol for about 0.5 to 2 hours at 25° to 45°C. and then bicarbonate solution and in water to obtain the neutral product.

Process for Producing Undecanedioic Acid from Plant Sources

KENNETH L. MIKOLAJCZAK

U. S. Patent 3,217,046. November 9, 1965

cis-11-Eicosenoic acid, which can be ozonized to yield undecanedioic acid and nonanoic acid, comprises more than 40% of the glyceride fatty acids extractable from the ground seeds of Marshallia

caespitosa (family Compositae) and from the seeds of two members of the Cruciferae family, namely Alyssum maritimum and Selenia grandis.

Process of Producing Soybean Proteinat

ARTHUR C. ELDRIDGE and ARLO M. NASH

U. S. Patent 3,218,307. November 16, 1965

A sodium proteinat that forms edible, gelatinlike thermo-reversibly hydrogels after heating for 5 minutes in about 8 to 15 parts of water is prepared by treating an isolated acid-precipitated fraction from an aqueous extract of hexane-extracted soy-

bean meal with a lower aliphatic alcohol or aqueous solution thereof, removing the alcohol, dissolving the precipitate in dilute alkali, and freeze-drying to yield a powdered product.

Crosslinked Poly- and Interpoly(amide-acetals)

EVERETT H. PRYDE

U. S. Patent 3,223,683. December 14, 1965

Linear poly(amide-acetal) polymers and linear interpoly(amide-acetal) polymers, which may then be cured by heating with an acid or metal oxide catalyst to form crosslinked transparent, infusible polymers that are extremely adherent to glass, are

prepared by vigorously heating the pentaerythritol acetal of azelaic semialdehyde or the pentaerythritol acetal of methyl azelaaldehyde, respectively, with an alkylene diamine or with an alkylene diamine plus dimethyl azelate.

Compositions for Paper Coating Containing Cyanoethylated Amylaceous Products

THOMAS E. YEATES, MERLE E. CARR, and CHARLES L. MEHLTRETTER

U. S. Patent 3,224,891. December 21, 1965

Stable water-dispersed paper coating compositions having solids contents of 40 to 60% comprise clay pigment and about 15% by weight based on the clay of a dextrin or an acid-modified, thin-boiling starch that has also been cyanoethylated to the extent of only 1 to 9 cyanoethyl groups per 100 anhydro-

glucose units of the amylaceous material (thus providing a D.S. of 0.01 to 0.09). The lowly cyanoethylated thin-boiling starch or dextrin binders provide very inexpensive paper coatings having an unexpectedly improved wax pick strength.

Carbohydrate Derived Polyamides

WILLIAM A. P. BLACK, ERIC T. DEWAR, and DAVID RUTHERFORD

U. S. Patent 3,225,012. December 21, 1965

Fiber-forming linear hexitol polyamides such as poly (1,6-dideoxy-2,4:3,5-di-O-methylene-1-sebacamide-D-mannitol) are obtained by the interfacial condensation of a substituted 1,6-diamino-1,6-dide-

oxyhexitol wherein the hexitol is mannitol, glucitol, iditol, or galactitol with sebacyl dichloride or terephthaloyl dichloride. The preparation of the required novel intermediates is also taught.

Improvement in Production of Beta-Carotene

ALEX CIEGLER

U. S. Patent 3,226,302. December 28, 1965

Addition of 1 to 2% by weight of pentane-hexane extracted waste Blakeslea trispora mycelia from a previous fermentation or of similarly extracted yeast

or other mold mycelia to fresh fermentations of B. trispora in a medium not containing β -ionone improve the production of β -carotene by about 50%.

Method of Preparing a Wax Ester Substitute for Jojoba Oil

THOMAS K. MIWA and IVAN A. WOLFF

U. S. Patent 3,226,406. December 28, 1965

A liquid wax ester having properties almost identical with those of jojoba oil is prepared by solvent extracting the oil from ground Limnanthes douglasii seed, saponifying, extracting the unsaponifiables, freeing the constituent fatty acids, and extracting to obtain the mixture of free fatty acids. A portion of the fatty acid mixture is converted to the corresponding fatty alcohols by reduction with sodium, and the jojoba oil substitute prepared by

reacting 1.10 mole eq. of the mixture of free fatty acids with 1.0 mole eq. of the corresponding alcohols in 100 mole eq. of xylene and in the presence of 0.015 mole eq. of p-toluenesulfonic acid monohydrate. Hydrogenation of the liquid wax ester yields a solid wax having a melting point of 66° to 68° C., which is identical with that of hydrogenated jojoba oil.

LICENSING OF PATENTS

Many of the inventions and discoveries of the Northern Division are covered by patents assigned either to the Secretary of Agriculture or dedicated for use by the public. These patents offer industry and business an opportunity to obtain licenses without charge. Patents do not necessarily contain any new or different information not in publications on the same subject.

Dedicated patents may be used freely without asking permission or applying for a license. If the patent is assigned, a license to practice the invention must be obtained from the Secretary of Agriculture. Licenses are granted without cost to any individual showing good faith and willingness to give proper attention to the development. There are no royalties, fees, or other charges. Any license issued by the Secretary of Agriculture on

patents assigned to him is nonexclusive, non-assignable, and revocable.

If a license is desired under an assigned patent, a letter of application should be addressed to the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250. The letter should state the name and principal place of business of the proposed licensee together with the name of the person who is authorized to sign on behalf of the licensee. It should also set forth the title of the invention and the patent number, if a patent has been issued. This information can be obtained from a printed copy of the patent, from the abstract as published in the Official Gazette of the U.S. Patent Office, or from the list included here. The Department will prepare the necessary form of license for execution.

Similar lists of publication abstracts and patents are available from the other three Regional Utilization Research and Development Divisions of the Agricultural Research Service, U.S. Department of Agriculture. The addresses and fields of research covered are:

DIVISION

Eastern Utilization Research
and Development Division
600 East Mermaid Lane
Philadelphia, Pennsylvania 19118

Southern Utilization Research
and Development Division
Post Office Box 19687
New Orleans, Louisiana 70119

Western Utilization Research
and Development Division
800 Buchanan Street
Albany, California 94710

PRINCIPAL FIELDS OF RESEARCH

Animal products: dairy, meat, fats, and leather; plant products: Eastern fruits and vegetables, tobacco, maple and allergen studies.

Cotton and cottonseed; pine gum; Southern fruits and vegetables, including citric, sweet-potatoes, and cucumbers; rice and peanuts.

Western fruits, nuts, vegetables, and rice; poultry products; forage crops; wheat and barley; wool and mohair; dry beans and peas; and castor beans.



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
NORTHERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION
1815 NORTH UNIVERSITY STREET
PEORIA, ILLINOIS 61604

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF AGRICULTURE

